WHAT IS CLAIMED IS:

1. A wireless communication receiver comprising:

an antenna array comprising plural antennas which provide respective plural series of signals for successive sets of pilot data;

a joint searcher and channel estimator which essentially concurrently considers the plural series of signals for determining both a time of arrival and channel coefficient.

2. The apparatus of claim 1, wherein the time of arrival and the channel coefficient are essentially concurrently determined by the joint searcher and channel estimator.

3. The apparatus of claim 2, wherein the time channel coefficient is a composite channel coefficient which takes into consideration channel impulse responses for channels associated with each of the plural antennas in the antenna array.

4. The apparatus of claim 1, further comprising a detector which utilizes the channel coefficient and the time of arrival to provide a symbol estimate.

5. The apparatus of claim 1, wherein the wireless communication receiver is a mobile terminal.

6. The apparatus of claim 1, wherein the wireless communication receiver is a network node.

7. The apparatus of claim 1, wherein each of the plural antennas in the antenna array is represented by an antenna index, wherein each of the sets of pilot data is represented by a pilot set index, and wherein the joint searcher and channel estimator comprises:

an antenna signal matrix in which a complex value indicative of a signal received in a sampling window is stored as a function of a sampling window time index, the antenna index, and the pilot set index;

a correlator which performs a Fast Fourier Transformation (FFT) calculation to generate a correlator output;

an analyzer which uses the correlator output to generate the time of arrival and the channel coefficient.

8. The apparatus of claim 7, wherein in performing the calculation the correlator considers plural possible frequencies of complex values along the antenna index and plural possible frequencies of complex values along the pilot set index, plural possible frequencies of complex values along the antenna index corresponding to plural possible directions of arrival and being represented by a frequency index n_1, the plural possible frequencies of complex values along the antenna index corresponding to plural possible doppler shifts and being represented by a frequency index n_2, and wherein for each combination of plural possible direction of arrival frequencies, plural possible doppler frequencies, and plural time indexes, the correlator calculates:

$$Y(n_1,n_2,t) = FFT(n_1,n_2,X(:,:,t))$$

wherein t is the sampling window time index; X(:,t) is the complex antenna matrix (with the colon ":" representing all antenna indexes for one sampling window time index).

9. The apparatus of claim 8, wherein for each combination of plural possible frequencies and plural time indexes, the method comprises evaluating the following expression:

$$Y(n,t) = \Sigma\, C_j * FFT(n,X(:,:,t)),\ j = 1,K$$

wherein C_j is a coding sequence symbol value j and K is the length of the coding sequence.

10. The apparatus of 8, wherein the correlator output comprises $Y(n_1,n_2,t)$, and wherein the analyzer determines a maximum absolute value $|Y(n_1,n_2,t)|_{max}$, wherein the analyzer uses a sampling window time index t_max at which $|Y(n_1,n_2,t)|_{max}$ occurs to determine the time of arrival of an arriving wavefront; wherein the analyzer uses the a direction of arrival frequency index n_1_max at which $|Y(n_1,n_2,t)|_{max}$ occurs to determine the doppler shift direction; and wherein the analyzer uses the a doppler frequency index n_2_max at which $|Y(n_1,n_2,t)|_{max}$ occurs to determine the doppler shift direction.

11. The apparatus of 8, wherein the correlator output comprises $Y(n_1,n_2,t)$, and wherein the analyzer determines a maximum absolute value $|Y(n_1,n_2,t)|_{max}$, wherein the analyzer obtains an amplitude for an arriving wavefront by dividing $|Y(n_1,n_2,t)|_{max}$ by a product of a number of sets of pilot data in the series and a number of antennas in the antenna array.

12. The apparatus of claim 1, wherein each of the plural antennas in the antenna array is represented by an antenna index, wherein each of the sets of pilot data is represented by a pilot set index, and wherein the joint searcher and channel estimator comprises:

an antenna signal matrix in which a complex value indicative of the signal received in a sampling window is stored as a function of a sampling window time index, the antenna index, and the pilot set index;

a parametric estimator which uses the complex value in the antenna signal matrix and generates a parametric output estimation vector

an analyzer which uses the parametric estimate output vector to generate the time of arrival and the channel coefficient.

13. The apparatus of claim 12, wherein each temporal frequency parameter corresponds to a possible doppler shift frequency.

14. The apparatus of claim 12, wherein each spatial frequency parameter corresponds to a possible direction of arrival.

15. The apparatus of claim 12, wherein the parametric estimate output vector has a sampling window time index, a spatial frequency parameter value, and a temporal frequency parameter, and wherein the analyzer uses absolute values of elements of the parametric estimate output vector to determine the time of arrival, the direction of arrival, and the doppler shift frequency of an arriving wavefront.

16. The apparatus of claim 15, wherein for an element of the parametric estimate output vector having a sufficiently high absolute value the analyzer uses the sampling window time index for an element of the parametric estimate output vector having a sufficiently high absolute value to determine the time of arrival of the arriving wavefront;

17. A method of operating a wireless communication receiver comprising: obtaining from plural antennas respective plural series of signals for successive sets of pilot data; concurrently using the plural series of signals for determining both a time of arrival and channel coefficient.

18. The method of claim 17, wherein the time of arrival and the channel coefficient are essentially concurrently determined by the joint searcher and channel estimator.

19. The method of claim 17, further comprising applying the channel coefficient and time of arrival to a detector to obtain a symbol estimate.

20. The method of claim 17, wherein the step of concurrently using the plural signals for determining both the time of arrival and the channel coefficient is performed by a joint searcher and channel estimator situated in a mobile terminal.

21. The method of claim 17, wherein the step of concurrently using the plural signals for determining both the time of arrival and the channel coefficient is performed by a joint searcher and channel estimator situated in a network node.

22. The method of claim 17, wherein each of the plural antennas in the antenna array is represented by an antenna index, wherein each of the sets of pilot data is represented by a pilot set index, wherein the step of concurrently using the plural signals for determining both the time of arrival and the channel coefficient is performed by a joint searcher and channel estimator, and further comprising the steps of the joint searcher and channel estimator:

storing a complex value indicative of the signal received in a sampling window an antenna signal matrix as a function of a sampling window time index, the antenna index, and the pilot set index;

performing a Fast Fourier Transformation (FFT) calculation to generate a correlator output;

using the correlator output to generate the time of arrival and the channel coefficient.

23. The method of claim 22, wherein in performing the calculation the correlator considers plural possible frequencies of complex values along the antenna index and plural possible frequencies of complex values along the pilot set index, plural possible frequencies of complex values along the antenna index corresponding to plural possible directions of arrival and being represented by a frequency index n_1, the plural possible frequencies of complex values along the antenna index corresponding to plural possible doppler shifts and being represented by a frequency index n_2, and wherein for each combination of plural possible direction of arrival frequencies, plural possible doppler frequencies, and plural time indexes; and wherein the correlator calculates:

$$Y(n_1,n_2,t) = FFT(n_1,n_2,X(:,:,t))$$

wherein t is the sampling window time index; X(:,:,t) is the complex antenna matrix (with the colons ":,:," representing all antenna indexes and all pilot indexes for one sampling window time index).

24. The method of claim 23, wherein for each combination of plural possible frequencies and plural time indexes, the method comprises evaluating the following expression:

$$Y(n,t) = \Sigma\ C_j *FFT(n,X(:,:,t)),\ j = 1,K$$

wherein C_j is a coding sequence symbol value j and K is the length of the coding sequence.

25. The method of claim 23, wherein the correlator output comprises $Y(n_1,n_2,t)$, and further comprising determining a maximum absolute value $|Y(n_1,n_2,t)|_{max}$.

26. The method of claim 25, further comprising:

using a sampling window time index t_max at which $|Y(n_1,n_2,t)|_{max}$ occurs to determine the time of arrival of an arriving wavefront;

using an antenna index n_1_max at which $|Y(n_1,n_2,t)|_{max}$ occurs to determine the direction of arrival of an arriving wavefront; and

using the doppler frequency index n_2_max at which $|Y(n_1,n_2,t)|_{max}$ to determine the doppler shift direction.

27. The method of claim 25, further comprising obtaining an amplitude for the arriving wavefront by dividing $|Y(n_1,n_2,t)|_{max}$ by a product of a number of sets of pilot data in the series and a number of antennas in the antenna array.

28. The method of claim 17, wherein each of the plural antennas in the antenna array is represented by an antenna index, wherein each of the sets of pilot data is represented by a pilot set index, and wherein the method further comprises:

storing, in an antenna signal matrix, a complex value indicative of the signal received in a sampling window as a function of a sampling window time index, the antenna index, and the pilot set index;

generating a parametric estimate output vector;

using the parametric estimate output vector to generate the time of arrival and the channel coefficient.

29. The method of claim 28, wherein each temporal frequency parameter corresponds to a possible doppler shift frequency.

30. The method of claim 28, wherein each spatial frequency parameter corresponds to a possible direction of arrival.

31. The method of claim 28, further comprising using absolute values of elements of the parametric estimate output vector to determine the time of arrival, direction of arrival, and doppler shift frequency of the arriving wavefront.

32. The method of claim 31, wherein for an element of the parametric estimate output vector having a sufficiently high absolute value, the method further comprises using the sampling window time index for an element of the parametric estimate output vector having a sufficiently high absolute value to determine the time of arrival of the arriving wavefront.